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Dear Don:

The recent conference on human cardiac transplantation held at O'Hare was most informative and useful, particularly in relation to the role of the National Heart Institute in this field of endeavor. In attempting to assess and evaluate the results of the conference, I was impressed with the following significant considerations:

1. Since approximately half of the surgeons stated that they did not anticipate performing a human cardiac transplant within the next year, it was apparent that there is no general consensus that this procedure is currently acceptable as a clinical method of management of certain forms of heart disease. In the ensuing discussion, it became apparent that there was a wide spectrum of opinion concerning the current "state of the art" based upon laboratory experience with cardiac transplantation and clinical experience with kidney and liver transplantation in providing justifiable ethical basis for the clinical application of the procedure. The impression was gained, however, that some convergence of these wide differences in opinion began to take place as an effort was made to define more precisely the type of heart disease that might provide the proper indication for the procedure. At this point, one gets into the involved and difficult issues of clinical judgments, evaluation of risks, and the like. Perhaps the most important conclusion to be reached from this discussion is that the screening process for case material is sufficiently fine in most cardiovascular centers to limit considerably the number of cases that may be so treated. I would estimate this number for each center to be less than six during the next year.

2. Critical problems that require solution to make the procedure a generally acceptable and practical method of treatment are concerned with the rejection phenomenon and availability of the donor heart. Current knowledge regarding methods of suppressing the rejection phenomenon in human organ transplantation is derived largely from considerable experience

with the kidney and extremely limited experience with the liver. To what extent these methods will serve the same purpose and the same degree of effectiveness in human cardiac transplantation is not known. These methods of suppression in animal cardiac transplantation have yielded much less effective results than in human kidney transplantation. But similar observations were made in animal kidney transplantation. Accordingly, the relatively low success rate in animal cardiac transplantation may not be applicable to humans.

There are two other aspects of this problem that have significant bearing upon cardiac transplantation as it differs from kidney transplantation. The patient with a kidney transplant may survive several episodes of rejection even when a fourth or possibly half the kidney function has been destroyed by this process, but partial destruction of the heart may not permit sufficient cardiac function to maintain survival of the patient. Secondly, even with complete destruction of a transplanted kidney, survival of the patient can be maintained temporarily by means of the artificial kidney until another kidney transplant can be performed. Thus, while the life of the patient is not necessarily threatened by failure of the transplanted kidney, it is definitely threatened by similar failure of the transplanted heart. This, of course, provides further support of the urgent need to develop an artificial heart even for temporary maintenance of life.

3. The urgent need to push ahead with the artificial heart program is readily apparent both in terms of developing a mechanical device to provide temporary replacement of cardiac function to maintain life for periods of days or weeks and to provide partial assistance to the failing heart. Although at present it may appear that homotransplantation may be the more immediate method of achieving complete replacement of the heart, there remains good reason to believe that the ultimate solution to this problem lies in the development of a completely implantable mechanical heart.

4. In regard to the assistance that could be given by the National Heart Institute to accelerate this field of endeavor, there was good consensus that more funds were needed to improve methods of suppressing the rejection phenomenon as well as in support of animal work on cardiac transplantation and to underwrite certain clinical trials. (In this connection, the estimate of about $20,000.00 per case seems reasonable. In this connection, too, it was estimated that supplemental funds in the amount of

about $150,000.00 per center for the next year are not unreasonable.) It was also recommended that these research funds should be made available to ongoing centers having the background and experience in both the cardiovascular and organ transplantation areas of endeavor. Incidentally, I believe this points up again the need to develop and support Cardiovascular Research and Training Centers capable of developing, advancing, and evaluating new and potentially more useful or effective clinical methods of management of heart disease.

Finally, I should like to suggest that consideration be given to placing this subject on the agenda for our meeting on January 5, 1968.

My best wishes for a Happy New Year.

Sincerely,

Mike

Michael E. De Bakey, M. D.

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